FRALIN BIOMEDICAL RESEARCH INSTITUTE AT VIRGINIA TECH CARILION
Merging Clinical Environments With Translational Medical Research and Educational Spaces
Presented by Daniel DiMarco, AIA and John Wissinger, AIA

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FRALIN BIOMEDICAL RESEARCH INSTITUTE AT VIRGINIA TECH CARILION
Merging Clinical Environments With Translational Medical Research and Educational Spaces

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ASSOCIATE PRINCIPAL
Learning Objectives

1. Learn strategies for merging three distinct environments — healthcare, research and education — in one cohesive building to encourage collaboration among practitioners, clinicians and students and promote innovation through the design of spaces that better facilitate the exchange of ideas.

2. Identify the intersection of interlocking feedback loops between medical research (“bench”) and medical care (“bedside”) to more expediently translate lab discoveries into clinical applications that improve health outcomes for patients.

3. Explore how sustainable design principles were applied to turn a brownfield site located in a flood plain into a thriving academic medical research campus that is enhancing the urban fabric along the Jefferson Street corridor.

4. Understand how to design mechanical, electrical and plumbing systems that support the flexible programmatic requirements of merged healthcare, research and education environments and maximize the building’s efficiency.
Today’s Agenda

- Trends in merging research and clinical environments
- Case study featuring Fralin Biomedical Research Institute
- Open discussion
“Success is a science; if you have the conditions, you get the result.”

– Oscar Wilde
Space Optimization
Research, Innovation, Learning & Development Center

RILD Center

Post Graduate Education Center

Wellcome Wolfson Center for Medical Research

National Institute for Health Research Exeter Clinical
Traditional Translational Pathway Diagram (Similar to Cooksey)

Illusion of Linearity when the reality is much more irregular with feedback loops
Flow and Efficiency
Institute of Immunology & Transplantation

Proposed Translational Pathway Diagram
Recognises irregularity and feedback loops
- demonstrating a way to shorten the bench to bedside process
Design the building to promote innovation by enhanced social cohesion.

Social Cohesion
Southampton Centre for Cancer Immunology
Social Cohesion
Southampton Centre for Cancer Immunology

University of Surrey

Oxford Bioscience Research Facility

Howard Hughes Medical Institute

Francis Crick Institute
Social Cohesion
Southampton Centre for Cancer Immunology
Convergence
Moorfields Eye Hospital

Architectural Integration Typologies

2. SPATIAL DISTRIBUTION

3. CO-LOCATION

5. COLLAGE
Convergence
Moorfields Eye Hospital

Architectural Integration Typologies

2. Spatial Distribution

3. Co-location

5. Collage

Other Integration Examples

Fabric Bonding: Heattech

In Biology: The Eye
Convergence
St. Pancras Hospital Campus Redevelopment
Health Sciences & Technology Center Site Location Study
Site Development Potential Analysis
Existing Parking Deck

VTC SOM & RI

Carilion Clinic

Riverside 3

Fralin Biomedical Research Institute

Carilion Riverside 1

Carilion Clinic Riverside 3
Alignment with the Project Vision
Alignment with the Project Vision
Alignment with the Project Vision
Alignment with the Project Vision
General Building Zoning

Wet Lab: 30%-55% RH (Min-Max)
Supplied with 100% fresh air handling system with heat recovery from the exhaust air systems
General Building Zoning
Lobby and Café View

OUTDOOR PATIO
ELEVATORS
RECEPTION
LOUNGE AREAS
First Floor Plan

Brain Health

Open Laboratories

Open Office Space

Biomaterials

Educational Space

Workshops
Second Floor Plan

Cardiovascular

Open Laboratories

Metabolism and Obesity

Open Office Space

Clinical Research

CLINICAL CORE
LAB
OFFICE

N
Third Floor Plan

Infectious Disease and Immunity

BSL3

Shared Facility

Green Roof

OPEN LABORATORIES
OFFICE SPACES
PUBLIC
Commons View

Third Floor

Second Floor

First Floor
Second Floor Plan
Second Floor Plan
Second Floor Plan
MERGING Healthcare Research and Education ENVIRONMENTS

- **WET LAB**: 24%
- **RESEARCH CORE**: 9%
- **DRY LAB**: 8%
- **OFFICES**: 6%
- **TRAINING/LIBRARY**: 9%
- **CORC/CLINICAL**: 13%
- **SHARED/MEP**: 31%

**Program Distribution**
Flexible Education Space

**SPACE SUMMARY**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>COMBINED CAPACITY</th>
<th>SQ. FT.</th>
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<tbody>
<tr>
<td>Lecture Hall and support space</td>
<td>210</td>
<td>3050</td>
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<tr>
<td>Large flexible lecture/classroom</td>
<td>100</td>
<td>2300</td>
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<tr>
<td>Collaborative classrooms</td>
<td>90</td>
<td>2400</td>
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<tr>
<td>Visualization labs</td>
<td>20</td>
<td>650</td>
</tr>
<tr>
<td>Small team study rooms</td>
<td>64</td>
<td>1280</td>
</tr>
<tr>
<td>Private, focused learning spaces</td>
<td>28</td>
<td>1120</td>
</tr>
<tr>
<td>Technology support offices</td>
<td>10</td>
<td>800</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>522</strong></td>
<td><strong>11,600</strong></td>
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</table>
Flexible Education Space

- FBRI at VTC = 30 SF per station
- Typical range = 10-20 SF per station
Site Features

- Hokie Stone retaining walls at porches and stairs
- Bike racks are strategic and highly visible
Collaboration Areas On Site

Open lawn space for site experience at grade

Open brick plaza for casual dining experience
<table>
<thead>
<tr>
<th>Category</th>
<th>Achievable</th>
<th>Total Available</th>
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<tbody>
<tr>
<td>01 Integrative Design Process</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>02 Location and Transportation</td>
<td>6</td>
<td>16</td>
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<tr>
<td>03 Sustainable Sites</td>
<td>6</td>
<td>10</td>
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<tr>
<td>04 Water Efficiency</td>
<td>9</td>
<td>2</td>
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<td>05 Energy and Atmosphere</td>
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<td>20</td>
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<td>06 Materials and Resources</td>
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<td>13</td>
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<tr>
<td>07 Indoor Environmental Quality</td>
<td>9</td>
<td>16</td>
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<tr>
<td>08 Innovation</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>09 Regional Priority</td>
<td>4</td>
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</tbody>
</table>

Note: Registered under LEED v4 and using LEED v4.1 for several of the credits
Rainwater Harvesting:

- Collecting 25,000 gallons by catching 13,000 SF of the upper roof surface
- Pumped by a submersible pump through multimedia filters and UV light disinfectors
- 60% water savings when calculated using LEED
Life Cycle Assessment

Virginia Tech student participation in research and credit analysis
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– Oscar Wilde
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Thank You